Grade: VII **Chapter 2 – Arithmetic Expressions** Subject: Mathematics

(Bolded Pg. Page Number, ? is the sign given to locate the questions, Textbooks (B), Classwork (C.W.) & Homework (H.W.) notes indicates where its preferably to write answers, Answers written in bold blue colour, the text written in this colour is explanation)

Pg:24 ? B Choose your favourite number and write as many expressions as you can having that value.

My favourite number is 33. I can write that number as in following arithmetic expressions 30+3=33, 11x3=33, 99/3=33, 50-17=33, 66/2=33, 15+18=33, 41-8=33, 1x33=33 and can also write in many other ways.

Pg:25 Figure it out 1 (Ex. 2.1.1) B Fill in the blanks to make the expressions equal on both sides of the = sign:

(a) 13 + 4 = ____ + 6 **13+4=17 => 17-6=11 Ans: 11**

(b) 22 + ____ = 6 × 5 **6x5=30 => 30-22=8 Ans: 8**

(c) 8 × ____ = 64 ÷ 2 **64/2=32 => 32/8=4 Ans: 4**

(d) 34 – ____ = 25 **25-34=-9 => -(-9)=9 Ans:9**

Pg:25 Figure it out 2 (Ex. 2.1.2) H.W Arrange the following expressions in ascending (increasing) order of their values. (a) 67 – 19, (b) 67 – 20, (c) 35 + 25, , (d) 5 × 11, (e) 120 ÷ 3

Soln.:

(a) 67 – 19 = 48, (b) 67 – 20 = 47, (c) 35 + 25 = 60, (d) 5 × 11 = 55, (e) 120 ÷ 3 = 40

The ascending values are 40, 47, 48, 55, 60

Therefore, the expressions in ascending order are (e) 120 ÷ 3, (b) 67 – 20 = 47, (a) 67 – 19 = 48, (d) 5 × 11 = 55, (c) 35 + 25 = 60

Ans: 120 ÷ 3 < 67 – 20 < 67 – 19 < 5 × 11 < 35 + 25

Pg:26 ? B Use '>' or '<' or '=' in each of the following expressions to compare them. Can you do it without complicated calculations? Explain your thinking in each case. a) 245+289 ☐ 246+285 (b) 273–145 ☐ 272–144

(c) 364+587 ☐ 363+589 (d) 124+245 ☐ 129+245 (e) 213–77 ☐ 214–76

Soln.:

Instead of adding and calculating the values of these arithmetic expressions and then justify greater or lesser or equal among two expressions, let us consider the lesser number among both the sides and fix it and then write the difference or sum of the greater number. Then it is easy to say, which is <,>,=.

a) 245+285+4 _____ 245+1+285 (Here, 245 is lesser than 246, so keeping 245 as it is, and adding 1 to 245 to get 246, similarly doing this for other number, we can strike out and can easily find the values).

~~245+285~~+4 _____ ~~245~~+1~~+285~~ **(Now, we can easily say, among 4 and 1, 4 is greater. So, 245+289 > 246+285~~).~~**

245+289 > 246+285

b) 272+1-144-1 _____ 272-144

= ~~272~~+1-~~144~~-1 _____ ~~272-144~~ => +1 ____ +1

273-145=272-144

c) 364+587 ____ 363+589

~~363~~+1~~+587~~ ____ ~~363+587~~+2

364+587 < 363+589

d) 124+245 ____ 129+245

~~124+245~~ ____ ~~124~~+5~~+245~~

124+245 < 129+245

e) 213-77 ____ 214-76

~~213-76~~-1 ~~213~~+1-~~76~~

213-77 < 214-76

Pg:28 ? B Check if replacing subtraction by addition in this way does not change the value of the expression, by taking different examples.

Let us the take the numbers 17 and 9, 17-9=8 => 17+(-8)=17;

20-3=17 => 20+(-3)=17; 47-24=23 => 47+(-24)=23;

659-374=285 => 659+(-374)=285. So, replacing subtraction by addition in this way does not change the value of the expression.

Pg:28 ? C.W. Can you explain why subtracting a number is the same as adding its inverse, using the Token Model of integers that we saw in the Class 6 textbook of mathematics?

Soln.:

Subtracting a number is the same as adding its inverse because removing a token has the exact same effect on your total value as introducing its opposite token. In the Class 6 Token Model, integers are represented using coloured counters or tokens:

- 🔵 **Positive tokens (usually blue or yellow) represent +1.**
- 🔴 **Negative tokens (usually red) represent -1.**

- ⚖️ **The Zero Pair Rule: Combining one positive token 🔵 and one negative token 🔴 equals 0. Because they cancel each other out, you can add or remove zero pairs from a pile without changing its actual value.**

For example, let us subtract 3-4.

Put down 3 positives. But there are not enough tokens to take out 4 positives! To get around this issue, we can put out an extra zero pair (a positive and a negative), knowing that this does not change the value of the set of tokens.

5-3 = 2

3

3-4 = -1

3+(-4) = -1 **This clearly says subtracting a number is the same as adding its inverse.**

Pg:29 ? B

Expression	Expression as the sum of its terms	Terms
13 – 2 + 6	13 + – 2 + 6	13, – 2, 6
5 + 6 × 3	5 + 6 × 3	5, 6x3 5,18
4 + 15 – 9	4 + 15 + -9	4, 15, -9
23 – 2 × 4 + 16	23 + -(2x4) + 16	23, -(2x4), 16 23, -8, 16
28 + 19 – 8	28 + 19 + -8	28, 19, -8

Pg:29 ? B Does changing the order in which the terms are added give different values?

No, For example, 33 + 12 +(– 7) = 38 or (– 7) + 33 + 12 = 38

Pg:29 ? B Will this also hold when there are terms having negative numbers as well? Take some more expressions and check.

Yes, For example: (– 4) + (– 2) = – 6 or (– 2) + (– 4) = – 6 (– 6) + (– 8) = – 14 or (– 8) + (– 6) = – 14. We can write some more examples.

Pg:30 ? B Can you explain why this is happening using the Token Model of integers that we saw in the Class 6 textbook of mathematics?

$(-4) + (-2) = -6$ or $(-2) + (-4) = -6$

Pg:30 ? C.W. Will this also hold when there are terms having negative numbers as well? Take some more expressions and check.

Soln.:

Yes, this also holds when there are terms having negative numbers as well. Below is the given example.

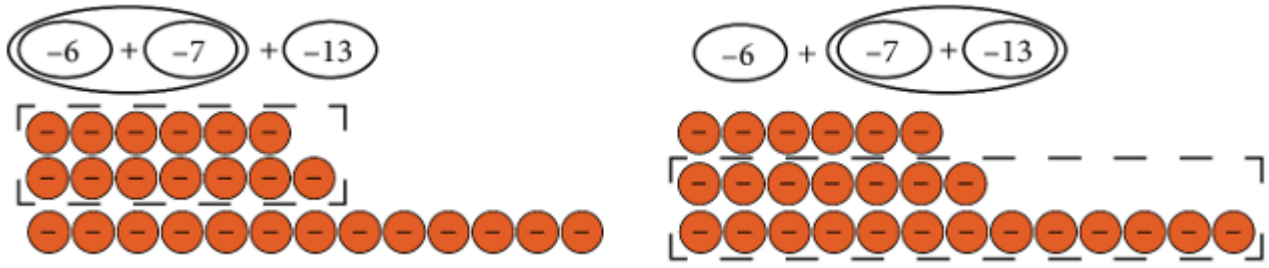
$(-6) + (-7) + (-13)$
$= (-6) + (-7) + (-13)$
$= -13 + -13$
$= -26$

$(-6) + (-7) + (-13)$
$= -6 + (-7) + (-13)$
$= -6 + -20$
$= -26$

Pg:30 ? C.W. Can you explain why this is happening using the Token Model of integers that we saw in the Class 6 textbook of mathematics?

Soln.:

Consider the expression -6 + (-7) + (-13)



Pg:31 ? C.W. Does adding the terms of an expression in any order give the same value? Take some more expressions and check. Consider expressions with more than 3 terms also.

Soln.:

Yes, adding the terms of an expression in any order gives the same value.

Consider an expression with 3 terms 9 + 4 + 6

Order 1: 9 + 4 + 6

= (9 + 4) + 6

= 13 + 6 = 19

Order 2: 9 + 4 + 6

= 9 + (4 + 6)

= 9 + 10 = 19

An expression with 4 terms (including a negative number)
Consider the expression: 15 + (– 8) + 5 + 12
Order 1: (15 + (– 8)) + 5 + 12
= (7 + 5) + 12
= 12 + 12 = 24
Order 2: 15 + 5 + 12 + (– 8)
= (15 + 5 + 12) + (– 8)
= ((15 + 5) + 12) + (– 8)
= (20 + 12) + (– 8)
= 32 + (– 8) = 24

Pg:31 ? H.W. Can you explain why this is happening using the Token Model of integers that we saw in the Class 6 textbook of mathematics?
Soln.: (same as previous sums token model examples)

Pg:31 ? B Manasa is adding a long list of numbers. It took her five minutes to add them all and she got the answer 11749. Then she realised that she had forgotten to include the fourth number 9055. Does she have to start all over again? **No, she can add fourth number, 9055 to the sum she got (11749) to get the correct sum of the list of given numbers. That is 11749 + 9055 = 20804 (Using Associative Property).**

Pg:32 ? H.W. If the total number of friends goes up to 7 and the tip remains the same, how much will they have to pay? Write an expression for this situation and identify its terms.
Soln.:
The expression for the total cost = 7 × 23 + 5 = 161 + 5 = ₹166.
The terms in the expression 7 × 23 + 5 are 7 × 23, 5.

Pg:33 ? B For each of the cases below, write the expression and identify its terms:
If the teacher had called out ‘4’, Ruby would write **8 x 4 + 1 = 33**
If the teacher had called out ‘7’, Ruby would write **4 x 7 + 5 = 33**
Write expressions like the above for your class size. **My Class size is 23. My expressions are 4 x 5 +3 = 5 x 4 + 3 = 3 x 7 + 2 = 23**

Pg:33 ? B Identify the terms in the two expressions above.
The terms are 8 x 4, 1 and 4 x 7, 5 for the expressions 8 x 4 +1 = 33, 4 x 7 + 5 = 33 respectively.

Pg:33 ? H.W. Can you think of some more ways of giving ₹432 to someone?

Soln.:

Way 1: 432 = 4 × 100 + 1 × 20 + 1 × 10 + 2 × 1

Terms: 4 × 100, 1 × 20, 1 × 10, and 2 × 1

Way 2: 432 = 8 × 50 + 1 × 10 + 4 × 5 + 2 × 1

Terms: 8 × 50, 1 × 10, 4 × 5, and 2 × 1

Way 3: 432 = 2 × 100 + 11 × 20 + 1 × 10 + 2 × 1

Terms: 2 × 100, 11 × 20, 1 × 10 and 2 × 1

Pg:34 Figure it out 1 (Ex.: 2.2.1) B Find the values of the following expressions by writing the terms in each case. (a) 28 – 7 + 8 (b) 39 – 2 × 6 + 11 (c) 40 – 10 + 10 + 10 (d) 48 – 10 × 2 + 16 ÷ 2 (e) 6 × 3 – 4 × 8 × 5

(a) Terms: 28,-7,8 Value: 29; (b) Terms: 39,-(2x6),11 Value: 38;

(c) Terms: 40,-10,10,10 Value: 50; (d) Terms: 48,-(10x2),16/2 Value: 36;

(e) Terms: 6x3,-(4x8x5) Value: -142

Pg:34 Figure it out 2 (Ex.: 2.2.2) C.W. Write a story/situation for each of the following expressions and find their values. (a) 89 + 21 – 10 (b) 5 × 12 – 6 (c) 4 × 9 + 2 × 6

Soln.:

a) 89 + 21 - 10

89 passengers were travelling in a cruise boat. At its stop, 21 passengers have boarded and 10 stepped down at ferry. Now, there are 100 passengers in the cruise boat.

b) 5 x 12 – 6

I bought 5 boxes of pencils with a dozen (12) in each, but accidentally dropped and lost 6 of them. I was left with exactly 54 pencils to hand out.

c) 4 x 9 + 2 x 6

A man goes to a hotel and ate 4 Idiyappam which costs each ₹4 with 2 Vadas which costs ₹6 each. Totally, he paid ₹48.

Pg:34 Figure it out 3.a. (Ex.: 2.2.3.a) C.W. 3. For the following situation, write the expression describing the situation, identify its terms and find the value of the expression. (a) Queen Alia gave 100 gold coins to Princess Elsa and 100 gold coins to Princess Anna last year. Princess Elsa used the coins to start a business and doubled her coins. Princess Anna bought jewellery and has only half of the coins left. Write an expression describing how many gold coins Princess Elsa and Princess Anna together have.

Soln.:

a) Gn.:

No. of gold coins Queen Alia gave to Princess Elsa = 100

No. of gold coins Queen Alia gave to Princess Anna = 100

Princess Elsa doubled her gold coins = 2 x 100

Princess Anna has left with half of the coins = 100/2

The expression of no. of gold coins that both having together is 2 x 100 + 100/2

The terms are 2x100,100/2. The value of the expression is 250.

(Since, 2 x 100 = 200, 100 / 2 = 50. So, 200 + 50 = 250)

Pg:34 Figure it out 3.b. (Ex.: 2.2.3.b) H.W. For the following situation, write the expression describing the situation, identify its terms and find the value of the expression. (b) A metro train ticket between two stations is ₹40 for an adult and ₹20 for a child. What is the total cost of tickets: (i) for four adults and three children? (ii) for two groups having three adults each?

Soln.:

b) Gn.:

Cost of metro ticket between two stations for adult = ₹40

Cost of metro ticket between two stations for children = ₹20

i) The expression for 4 adult and 3 children is 4 x 40 + 3 x 20

The terms are 4x40, 3x20. The value is 220.

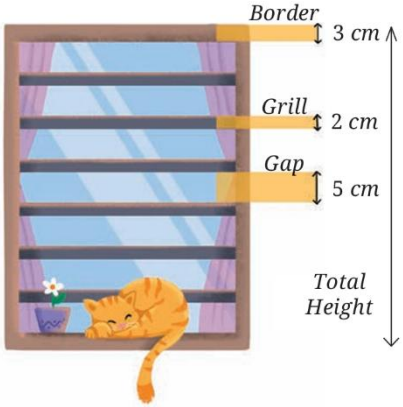
The total cost of tickets for four adults and three children is ₹220

ii) i) The expression for two groups having three adults each is 2 x (3 x 40)

The terms are 2 x (3 x 40). The value is 240.

The total cost of tickets for two groups having three adults each is ₹240

Pg:35 Figure it out 3.c. (Ex.: 2.2.3.c) C.W. Find the total height of the window by writing an expression describing the relationship among the measurements shown in the picture.



Soln.:

Gn.: Width of the border in window = 3cm

Width of the grill in window = 2cm

Width of the gap in window = 5cm

From our observation, we see,

No. of borders, grills, and gaps present in windows are 2, 6 and 7 respectively.

The expression is 2x3 + 6x2 + 7x5. The terms are 2x3, 6x2, 7x5. The total height of the window is 53cms.